REMARKS / ARGUMENTS

In complete response to the outstanding Official Action of April 9, 2003, on the above-identified application, reconsideration is respectfully requested.

Claim Rejection Under 35 U.S.C. § 112:

Claims 4-7 and 9 stand rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner notes the indefiniteness of what constitutes 'high purity water'. Applicants respectfully maintain that sufficient support can be found in the specification to remove this indefiniteness.

Specifically, high purity water is defined in the specification as "typically deionized water, a central source (not shown) for which is generally present in semiconductor manufacturing facilities." (Page 8, Lines 4 through 6). One of ordinary skill in the art would recognize industrial standards and guidelines for most of the chemicals that are used in the semiconductor industry. For example, Semiconductor Equipment and Materials International (SEMI) is an organization that is widely recognized for establishing guidelines and specifications within the semiconductor industry.

SEMI has published "Guidelines For Ultrapure Water Used In Semiconductor Processing" (SEMI F63-0701 July 2001), which identifies a number of purity parameters and ranges that are permissible for each parameter (see Table 1, Page 2). One of ordinary skill in the art would realize that facilities for the production of this high purity water would exist within the semiconductor facilities, and therefore could request access to this high purity water to utilize the present invention.

Claim Rejection Under 35 U.S.C. § 102:

FIRST CLAIM REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 15 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Even et al. '143. Applicants respectfully maintain that the present invention is not anticipated by Even et al.'143.

The Examiner notes that Even et al. '143 "disclose a process for treating an ion exchange resin with supercritical carbon dioxide." The Examiner further cites a definition provided by Even et al '143, that "a supercritical fluid is a dense phase gas." Applicants respectfully disagree with this definition.

The characterization of supercritical carbon dioxide as a "dense phase gas," is scientifically imprecise. It is well known that supercritical fluids exist at a temperature and pressure greater than or equal to the critical temperature and pressure of that fluid. For carbon dioxide, the critical pressure is about 1070 psi and the critical temperature is about 88 ^{o}F.

Moreover, it is well documented that supercritical fluids possess unique characteristics that are fundamentally different from those possessed by either the gas or liquid phase of that same fluid. Supercritical carbon dioxide maintains a liquid's ability to dissolve substances that are soluble in the compound, which is impossible in the gas phase. It is well known that the solvent power of supercritical fluids is similar to that of a light hydrocarbon, however, it presents no risk to the environment.

Supercritical carbon dioxide can remove oils and other organic contaminants from a surface even if it possesses a complex topography. This is the characteristic that the method disclosed in Even et al '143 endeavors to

exploit, specifically, to clean resin. This is discussed several times in the Even et al. '143 specification, notably at Column 5, Line 55 to 57:

> "Both liquid and supercritical carbon dioxide have liquid-like densities that contribute to their good solvent properties."

In contrast, the present invention utilizes carbon dioxide in the gas phase, not in the supercritical phase as disclosed in Even et al '143. The present invention operates at atmospheric pressure, rather than the extremely elevated pressure required by supercritical carbon dioxide. Additionally, the present design is more economical due to the lower equipment cost, and safer due to the significantly lower operating pressure.

The supercritical carbon dioxide may actually turn the resin into the carbonate form, not the needed bicarbonate form. For the present invention, the carbonate form is too basic and thereby will not enable the pre-conditioning process to occur. In the present invention, non-supercritical carbon dioxide is utilized to effectively precondition the process.

Therefore, one of ordinary skill in the art would not find that Even et al. '143 teaches or suggests the invention in the present application.

SECOND CLAIM REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by either Holl et al. '922 or Petheram '185. Applicants respectfully maintain that the present invention is not anticipated by either Holl et al. '922 or Petheram '185.

The Examiner notes that Holl et al. '922 and Petheram '185 "disclose contacting anion exchange resins with aqueous mediums which contain carbon dioxide gas."

The disclosure in Holl et al. '922 requires the use of calcium carbonate simultaneously with carbon dioxide. This calcium carbonate would leave a contaminant residue that would render the preconditioning process in the present invention impossible. The purpose of the present invention is to eliminate all contaminating cations, whereas the process disclosed in Holl et al. '922 teaches the introduction of such contaminants.

The disclosure in Petheram '185 pertains to using carbon dioxide to *remove* the residual waste from a *prior* regeneration step. Petheram '185 does not use the carbon dioxide to actually regenerate the ion-exchange resins them.

Therefore, one of ordinary skill in the art would find that neither Holl et al. '922 nor Petheram '185 teach or suggest the present invention.

THIRD CLAIM REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 15 stand rejected under 35 U.S.C. § 102(e) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as being obvious over Dias et al '797. Applicants respectfully maintain that the present invention is neither anticipated by, nor obvious over, Dias et al '797.

The Examiner notes that Dias et al '797 "disclose a method for extracting leachable contaminants from ion exchange resins by exposing the resins to supercritical carbon dioxide ...."

The disclosure in Dias et al '797 teaches the removal of soluble impurities from resins. In contrast, the present invention converts anion resin from the OH^- or CL^- form to the HCO_3 form. This entails an ionic process, not a leaching process. The disclosure in Dias et al. '797 also involves the use of supercritical carbon dioxide, which is fundamentally different from the use of non-supercritical carbon dioxide in the present invention.

Therefore, one of ordinary skill in the art would find that Dias et al '797 neither teaches nor suggests the present invention.

Claim Rejection Under 35 U.S.C. § 103:

FIRST CLAIM REJECTION UNDER 35 U.S.C. § 103

Claims 2-14, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Petheram '185 or Even at al '143 or Holl et al '922. Applicants respectfully maintain that the present invention is not unpatentable over Petheram '185 or Even at al '143 or Holl et al '922.

As discussed above, Petheram '185 pertains to using carbon dioxide to remove the residual waste from a prior regeneration step. It would not be *prima facia* obvious to one of ordinary skill in the art to modify such a process by:

- Using "Dow ® 550 anion exchange resin". (Claims 2 and 17) Petheram '185 is directed toward the cleansing of '***weak base*** ion exchange resins' in contrast, the present invention, Dow ® 550 (DOWEX Monosphere 550 A) is a ***strong base*** ion exchange resin.
- "Passing said carbon dioxide gas through said ionic exchange, ***purifying*** the carbon dioxide gas." (Claim 3) The entire purpose behind the process disclosed in Petheram '185 is to ***contaminate*** the carbon dioxide (actually carbonic acid) and to remove regenerated waste from *the resin*.
- Purifying the carbon dioxide gas in an ionic purifier, prior to coming into contact with the ion exchange resin. (Claims 4, 5, 6, and 7) There is no intention in Petheram '185 to raise the purity of the carbon dioxide to a high level. The purity of the carbon dioxide is not critical, and therefore is not addressed in Petheram '185.

- The preconditioning of the resin. (Claims 8, 9, and 10). Petheram '185 is directed toward the removal of unwanted waste ***after*** the resins have been in contacted with a regenerant solution.
- ***Converting*** the anion exchange resin to a bicarbonate form. (Claims 11, 12, and 16). Petheram '185 ***does not disclose any resin conversion***, as it is only related to the removal of unwanted waste after the resins have been contacted with a regenerant solution.
- Rinsing the resin with deionized water ***after*** passing the carbon dioxide gas through the resin. (Claims 13 and 14) In Petheram '185, the resin is rinsed with pure water ***before*** being contacted with the carbon dioxide (which is specified to be carbonic acid and not carbon dioxide gas).

Therefore, one of ordinary skill in the art would not find the present invention *prima facia* obvious over Petheram '185.

As discussed, Even et al. '143 pertains to the use of supercritical carbon dioxide. This supercritical carbon dioxide is a solvent used to remove the perchlorate anion from the spent resin. Since independent claim 1 of the present invention is allowable over Even et al. '143 for the reasons provided above, claims 2-14, 16 and 17 are also allowable since they are dependent upon it.

Therefore, one of ordinary skill in the art would not find the present invention *prima facia* obvious over Even et al. '143.

As discussed above, Holl et al '922 pertains to the simultaneous use of calcium carbonate and carbon dioxide in the treatment of resins. Since independent claim 1 of the present invention is allowable over Holl et al. '922 for the reasons enumerated, claims 2-14, 16, and 17 are also allowable since they are dependent upon it.

Therefore, one of ordinary skill in the art would not find the present invention *prima facia* obvious over Holl et al. '922.

SECOND CLAIM REJECTION UNDER 35 U.S.C. § 103

Claims 2-14, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dias et al '797. Applicants respectfully maintain that the present invention is not unpatentable over Dias et al. '797.

As discussed above, Dias et al '797 teaches the removal of soluble impurities from resins, in a non-ionic process, using supercritical carbon dioxide. Since independent claim 1 of the present invention is allowable over Dias et al. '797 for the reasons provided above, claims 2-14, 16, and 17 are also allowable since they are dependent upon it.

Therefore, one of ordinary skill in the art would not find the present invention *prima facia* obvious over Dias et al. '797.

CONCLUSION

In view of the current amendments, the present application now stands in condition for allowance. Early notice to this effect is earnestly solicited.

Should the Examiner believe that a telephone call would expedite prosecution of the application, he is invited to call the undersigned attorney at the number listed below.

Respectfully submitted,

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CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 11th day of August, 2003.

Stacy Forte